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APPLICATION FOR UNITED STATES LETTERS PATENT

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TITLE: FRAGMENT PROJECTILE

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[0001] This application claims the priority of German Patent Application, DE 102 48 696.4 filed October 18, 2002 and which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] The invention relates to a fragment projectile.

[0003] Fragment projectiles are known from, for example, German Patent No. DE 196 26 660 C2 corresponding to U.S. Patent No. 5,900,580. The subject of this patent is full-caliber projectiles having a projectile casing, which surrounds a hollow space that is filled in the front region with heavy-metal fragments. Additionally, an explosive charge is disposed inside the projectile casing. The charge is detonated at a predetermined time, and the fragments are accelerated, for example, in the direction of the target.

[0004] A drawback of fragment projectiles of this type is that they have a low rate of effectiveness, because the percentage by mass that causes the fragmentation effect is low relative to the projectile weight.

SUMMARY OF THE INVENTION

[0005] It is the object of the invention to provide a fragment projectile that can be produced at a low cost and has a sufficient fragment distribution in the target region for combating targets.

[0006] In accordance with the invention, this object generally is accomplished by a fragment projectile, comprising: a projectile casing that surrounds and defines a hollow space; heavy metal fragments at least partially filling the hollow space; and an ejector charge disposed at the rear of the hollow space to eject the fragments from the projectile casing when activated during the flight of the projectile. Preferably, the activation takes place at a predetermined time during flight due to a timer disposed on the projectile. Further advantageous embodiments of the invention are disclosed.

[0007] The invention is essentially based on the concept of omitting the use of explosives in the fragment projectile, and filling the space required for the explosive with fragments. A relatively compact pyrotechnical ejector charge effects the ejection of the fragments at a desired, e.g., predetermined time.

[0008] In addition to offering a less expensive production of such projectiles, the invention solves the problem of the firing reliability of explosives that is inherent to conventional fragment projectiles.

[0009] To avoid the dramatic drop in projectile speed, and thus of the fragments during flight, that occurs in full-caliber projectiles, it has proven advantageous to construct the fragment projectile as a subcaliber projectile in a simple manner. These projectiles possess a significantly higher muzzle velocity, and exhibit a much smaller drop in speed during flight. Furthermore, in fin-stabilized projectiles, the guidance assembly can be permanently mounted to the projectile. As a result, costs are further reduced and the hit probability is improved in comparison to full-caliber projectiles, in which collapsible guidance assemblies must usually be used.

[0010] While a sub caliber projectile offers less space for the fragments, the available space typically suffices for effective target combat, e.g., the threat of armored defense weapons in a protective position or light-armored vehicles, because of the absence of the explosive charge.

[0011] Further details about and advantages of the invention ensue from the following exemplary embodiment explained in conjunction with a figure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The Figure is a schematic cross-section view of a fin-stabilized sub-section projectile according to the invention providing with a propelling cage sabot

DETAILED DESCRIPTION OF THE INVENTION

[0013] Referring now to the Figure, there is shown a fin-stabilized, subcaliber fragment projectile 1 that is surrounded by an aluminum propelling cage sabot 2, which is segmented in a known manner. The projectile can be fired from a 120-mm caliber tank gun, for example.

[0014] The fragment projectile 1 includes a projectile casing 3, having a hollow interior space 7 in which a packet of spherical fragments 4 comprised of heavy metal, e.g., tungsten (WSM), is disposed. The projectile casing 3 also contains an ejector charge 5 at the rear of the hollow space and a

programmable timer fuse 6. A fin stabilization unit 8 is affixed to the rear of the casing 3.

[0015] In the intended use of the fragment projectile 1 of the invention, after the projectile exits the gun barrel, not shown, the propellant cage sabot 2 initially is ejected in a known manner and the projectile 1 follows its flight trajectory to the vicinity of the target region. There, the timer fuse 6 ignites the ejector charge 5 at a desired, in this case, predetermined time. The charge pushes the spherical fragments 4 out of the front of the projectile 1 by bursting the tip 7.

[0016] To assure a reproducible ejection of the spherical fragments 4, predetermined fracture points, not shown in the Figure, are provided in the region of the projectile tip 7.

[0017] After the projectile tip 7 bursts, the residual projectile abruptly slows its speed because of the high air resistance. In contrast, at the time of the fragment ejection process, the relatively heavy spherical fragments 4 fly further into the target region at about the same original speed of the projectile.

[0018] Of course, the invention is not limited to the above-described exemplary embodiment. For example, non-spherical fragments can be used instead of spherical ones. A heavy

metal other than tungsten heavy metal can also be used as the fragment material. Furthermore, the fragment projectile can also be spin-stabilized. Finally, the timer fuse can also be replaced by a proximity fuse.

[0019] The invention now being fully described, it will be
apparent to one of ordinary skill in the art that many changes
and modifications can be made thereto without departing from
the spirit or scope of the invention as set forth herein.